Proposed draft 316(b) permit conditions for Lower Monumental Lock and Dam in the Lower Snake River, Washington (Subject to the Federal Columbia River Power System 2019 Biological Opinion)

A. Cooling Water Intake Structure (CWIS) Requirements to Minimize Adverse Impacts from Impingement and Entrainment

1. Best Technology Available. The design, location, construction, and capacity of the permittee's CWISs shall reflect the best technology available (BTA) for minimizing adverse environmental impacts from the impingement and entrainment of various life stages of fish (*e.g.*, eggs, larvae, juveniles, adults) by the CWISs.

2. The EPA has determined the following requirements as BTA for impingement mortality and entrainment. To minimize entrainment mortality and to minimize impingement mortality, the permittee shall implement the following BTA:

   a) Keep the submersible traveling screen and vertical bar screens free of debris or other material through regular and preventive maintenance and inspections.
   b) Maintain a physical screening or exclusion technology on the cooling water intake.

3. The permittee must properly operate and maintain the technologies identified above.

4. The permittee must conduct regular visual inspections of BTA on a monthly basis in Years 1 and 2 of the permit and quarterly in the remining years of the permit or employ remote monitoring devices to ensure that any technologies established as the BTA are maintained and operated to function as designed. The visual inspections must include a record of the number of organisms impinged on BTA, a description of the integrity of the BTA function and structure, and problems that may be occurring with the maintenance and operation of BTA. The permittee must keep a log of the visual inspections at the facility and must be made available to EPA or an authorized representative upon request.

5. The permittee must prepare a CWIS Annual Report documenting implementation, operations, and maintenance of BTA. The Report must be submitted by December 31st of each year. The Report must include a certification statement required by 125.97(c) that BTA has been properly operated and maintained and that no changes to the facility have been made unless documented. The permittee may submit written notification as an electronic attachment to the DMR. The file name of the electronic attachment must be as follows: YYYY_MM_DD_WA0026701_CWIS_05899, where YYYY_MM_DD is the date that the permittee submits the written notification.

Proposed draft Fact Sheet 316(b) language for Lower Monumental Lock and Dam, Snake River

A. Cooling Water Intake Structure (CWIS)
Section 316(b) of the CWA, 33 USC § 1316(b), requires that facilities with CWIS ensure that the location, design, construction, and capacity of the structure reflect the best technology available (BTA) to minimize adverse impacts on the environment. The statute requires the permit writer to establish BTA on a case-by-case basis using best professional judgment to establish BTA standards to reduce impingement and entrainment of aquatic organisms at existing power generating and manufacturing facilities. Impingement occurs when fish or shellfish become entrapped on the outer part of intake screens and entrainment occurs when fish or shellfish pass through the screens and into the cooling water system.

On August 15, 2014, the EPA promulgated regulations (40 CFR 125.90) to implement CWA Section 316(b) at existing facilities with CWIS with a design intake flow greater than 2 MGD and that use at least 25% of the withdrawn water for cooling purposes. These regulations establish requirements for minimizing adverse environmental impacts associated with CWIS and procedures, including permit application requirements, for establishing the appropriate technology requirements. Together these requirements represent BTA for minimizing adverse environmental impacts associated with the use of CWIS. If a facility with a CWIS falls below the thresholds set forth in 40 CFR 125.90, then BTA is established on a case-by-case basis using best professional judgment. {Insert language on why BPJ, not the Rule, applies to the facilities.}

For the four hydroelectric generating facilities, the cooling water intakes for the Lower Snake River hydroelectric facilities are the points where water is diverted for cooling water purposes. For example, where cooling water is drawn off the scroll case, the intake is the point where the water is diverted from the scroll case. The cooling water intake is *not* the gravity intake where water from the river is taken in for hydroelectric purposes. That intake is for pass-through water for hydroelectric purposes, which do not require an NPDES permit (*See National Wildlife Federation v. Consumers Power Company*, 862 F.2d 580 (6th Cir. 1988); *National Wildlife Federation v. Gorsuch,* 693 F.2d 156 (D.C. Cir. 1982). However, at the point that water is diverted for cooling water and pollutants are added, such as heat, those waters require NPDES permits.

The EPA used the amount of cooling water discharged as a proxy for the amount of cooling water taken in. Table 17 provides the total amount of cooling water discharged if every unit were operating at its maximum flow rate and all of the discharge was cooling water. It also contains the minimum daily average flow between 2011 and 2016 that Lower Monumental Lock and Dam uses for hydropower generation.

Table [SEQ Table * ARABIC]. Summary of Maximum Daily Average Cooling Water Discharges from Lower Snake River Hydroelectric Generating Projects

	Ice Harbor Lock and Dam	**Lower Monumental Lock and Dam**	**Little Goose Lock and Dam**	**Lower Granite Lock and Dam**
Cooling Water Discharges (MGD)	17.5 MGD	14 MGD	19 MGD	14 MGD
Minimum Daily Average Flows Passed Through or Used for Hydropower Generation (2011-2016)	5791 MGD	6845 MGD	6657 MGD	5791 MGD

Since the Clean Water 316(b) statute applies to Ice Harbor Lock and Dam, Lower Monumental Lock and Dam, Little Goose Lock and Dam, and Lower Granite Lock and Dam, the EPA must determine BTA for the CWIS. To evaluate BTA using best professional judgment, the EPA considered facility-specific information, background information from actions required by the Federal Columbia Power System (FCRPS) Biological Opinion (BiOp), standards for impingement mortality at 125.94(c) and BTA standards for entrainment at existing facilities at 125.94(d).

The EPA has determined the BTA for minimizing impingement mortality and entrainment at the Lower Monumental Lock and Dam are trash racks, submersible traveling screens at the gravity intake and physical screens at the cooling water intake structure. {Insert BTA for other facilities, which are expected to be similar to Lower Monumental Lock and Dam.} The permit requires that these BTA be operated and maintained to ensure integrity of their structure and function. The permit further requires the facilities to conduct a monthly visual inspection in the first two years of the permit and a quarterly visual inspection for the remaining years of the permit. The visual inspections must include the number of fish impinged on BTA, a description of the integrity of the BTA function and structure, and problems that may be occurring with the maintenance and operation of BTA. In addition, the permit requires a CWIS Annual Report that BTA have been properly operated and maintained. The BTA and permit conditions will help to ensure that BTA function effectively currently and in the future.

The EPA evaluated the likelihood of entrainment of organisms in hydroelectric facilities, by considered cooling water volumes relative to water used for hydropower generation. In the New Facility Rule, EPA established "proportional-flow requirements" to provide additional protections commensurate with closed cycle and velocity requirements. For rivers and streams, EPA found that,

> *"The 5 percent value for rivers and streams reflects an estimate that this would entrain approximately 5 percent of the river or stream's entrainable organisms and a policy judgment that a greater degree of entrainment reflects an inappropriately located facility."*

Therefore, it was determined that the amount of entrainable organisms was proportional to the percentage of flow used for cooling water compared to river and stream flow. The Lower Monumental Lock and Dam is a run-of-the-river dam, which between 2011-2016, used a minimum average daily flow of 6844 MGD for hydropower generation. Of this flow, the facility diverted a maximum of 15 MGD for cooling water. This represents 0.41% of the water used for cooling water compared to water withdrawn for hydropower generation. Therefore, in addition to the studies above, the EPA believes that impacts from entrainment are also low based on the proportion of cooling water compared to river flow.

Ex. 5 Deliberative Process (DP)

To determine the sufficiency of BTA to minimize impingement and entrainment, the EPA further considered background information from the Federal Columbia River Power System (FCRPS) 2019 Supplemental Biological Opinion (BiOp). The Lower Snake River hydroelectric generating facilities are part of the FCRPS, which has a series of BiOps issued by the National Oceanic and Atmospheric Administration (NOAA). These BiOps require actions called reasonable and prudent alternatives (RPAs) to minimize and address adverse effects to threatened and endangered salmon. Currently, the FCRPS 2014 BiOp and Supplemental BiOp are in effect and require the facilities in the FCRPS to comply with RPAs from hydropower operations to increase threatened and endangered juvenile fish survivability and minimize fish mortality. These include operations and configuration improvements such as increased spilling to maximize fish passage through dams to achieve a 96% survival for juvenile spring Chinook Salmon and steelhead and 93% for subyearling chinook salmon. RPAs 22-25 are specific to optimizing the configurations and operations for the four hydroelectric generating facilities on the Lower Snake River. RPAs 27 and 29-32 also require measures to optimize dam operations. As an example RPA, Table 18 shows RPA 32 for hydropower operations, which requires the Lower Columbia River and Lower Snake River hydroelectric projects to develop annual Fish Passage Plans (FPP) in coordination with NOAA and other federal, state and tribal agencies to prioritize, optimize, and maintain operations and maintenance for each facility to maintain high levels of fish survivability.

Table [SEQ Table * ARABIC]. RPA 32 for Hydropower Operations in 2014 FCRPS Supplemental BiOp for Lower Columbia River and Lower Snake River Hydroelectric Generating Facilities

RPA No.	Action Description	Implementation Plans, Annual Progress Reporting and Comprehensive RPA Evaluations
Hydropower Strategy 4—Operate and Maintain Facilities at Corps' Mainstem Projects to Maintain Biological Performance		
32	**Fish Passage Plan** The Corps will annually prepare a FPP in coordination with NOAA Fisheries and the Regional Forum through the FPOM. The Corps will operate its projects (including juvenile and adult fish passage facilities) year-round in accordance with the criteria in the FPP. Comments developed by NOAA Fisheries on the draft FPP shall be reconciled by the Corps in writing to NOAA Fisheries' satisfaction before release of the final FPP. Key elements of the plan include: • Operate according to project-specific criteria and dates to operate and maintain fish facilities, turbine operating priorities, and spill patterns; • Operate according to fish transportation criteria; • Maintain turbine operations within the 1% of best efficiency range; • Maintain spillway discharge levels and dates to provide project spill for fish passage; • Implement TDG monitoring plan; • Operate according to protocols for fish trapping and handling; • Take advantage of low river conditions, low reservoir elevations or periods outside the juvenile migration season to accomplish repairs, maintenance, or inspections so there is little or no effect on juvenile fish; • Coordinate routine and non-routine maintenance that affects fish operations or structures to eliminate and/or minimize fish operation impacts; • Schedule routine maintenance during non-fish passage periods; • Conduct non-routine maintenance activities as needed; and • Coordinate criteria changes and emergency operations with FPOM. **Operations and Maintenance** • Provide redundancy or contingency plans, developed in coordination with	<u>**Implementation Plans**</u> • The FPP is prepared annually. <u>**Annual Progress Report**</u> • Not applicable. <u>**2013 and 2016 Comprehensive RPA Evaluation Reports**</u> • Not applicable.

	NOAA Fisheries and the Regional Forum, which will assure that key adult fish passage facility equipment operates as necessary to minimize long-term adult passage delays. ▪ Evaluate the condition of items necessary (e.g., spillway hoist systems, cranes, turbine units, AWS systems, etc.) to provide safe and effective fish passage and develop a prioritized list of these items that are likely to require maintenance now or within the term of this Opinion.	

The USACE publishes Fish Passage Plans (FPPs) each year on the technologies and operations each project uses to optimize fish survivability for threatened and endangered species as required by the FCRPS 2014 BiOp. The USACE develops these plans in conjunction with the Fish Passage Operations and Maintenance (FPOM) workgroup, a consortium of federal, state, and tribal agencies. Together, they determine detailed operations and maintenance procedures annually to optimize fish passage and maintain high rates of survivability.

Generally, the hydroelectric generating facilities' approach to maximize fish survivability is to route fish away from intakes for hydroelectric generating water that enters turbines, which are believed to have a higher likelihood of harming or killing fish. Instead, the facilities operate their dam spillways and non-turbine fish passage structures to encourage fish to use them and employ physical means to discourage fish from entering the intakes for hydroelectric generating water. These efforts to provide fish passage through non-turbine routes have been successful. According to the FCRPS 2016 BiOp Evaluation, 76-99% of juvenile salmonids through 2015, use non-turbine routes. The high rate of juvenile salmonids using non-turbine routes also translates to fish not being impinged or entrained in cooling water intake structures, which are downstream of the intakes for hydroelectric generating water.

Optimal spill requirements for fish passage are complex. The USACE in consultation with FPOM develops a Fish Operations Plan that specifies spill schedules including, flow, timing and shape of the spill to best maximize fish passage over the dams. The FPPs require implementation of these spill schedules in addition to maintenance of structures leading to the spillways to ensure they are free of debris. All of the Lower Snake River hydroelectric generating facilities also have juvenile fish passage structures, which provide alternative non-turbine pathways to bypass the dam. Ice Harbor Lock and Dam and Lower Monumental Lock and Dam have submersible traveling screens (STS) which route fish to fish passage structures and deflect fish from entering into hydroelectric generating water intake structures that go to turbines. Little Goose Lock and Dam and Lower Granite Lock and Dam have extended length submersible bar screens (ESBS) which also deflect fish to fish passage structures. Each of the facilities maintain and inspect screens leading to fish passage structures or diverting fish to structures regularly to ensure they are free of trash and debris. These structures are also operated according to FPP guidelines, such as specifying the water levels in gatewells leading to fish passage structures.

Where fish do enter the intake for hydroelectric generating waters and from where cooling water is withdrawn, the turbines are operated close to peak efficiency, which is believed to be optimal for fish to pass through turbines with the lowest mortality and harm. At lower flows, fish may enter parts of the turbine which will damage them. At too high flows, fish may not survive passage through turbines. At peak efficiency flows, juvenile fish may pass through the turbines with the least amount of damage. FPPs require that turbines at the Lower Snake River hydroelectric generating facilities operate within +/- 1% of peak efficiency. Additionally, it requires turbines to be operated in priority order based on optimizing fish passage, related to location, turbine operation, and configuration. Thus, these technologies and operations together work to optimize fish passage.

The FPPs also have extensive maintenance and operation requirements, such as inspecting fish passage facilities 3 times a day, 7 days a week during fish passage, preventive maintenance and repair of submersible traveling screens, and ensuring trash racks are cleaned. These FPPs specifically list when and where different technologies should be operated to maximize fish passage. The FPP for 2018-2019 also describes detailed inspection and reporting criteria, including weekly written inspection reports to NOAA for out-of-criteria situations, adjustments to resolve issues, impacts to fish passage and survival, and equipment calibration. These actions, in sum, ensure that each project is evaluating and operating its systems to maximize fish survivability for threatened and endangered species. Because the FCRPS 2014 BiOp requires annual updates to FPPs, the hydropower facilities continually evaluate and optimize their operations to maximize fish passage.

To evaluate the adequacy and optimization of the hydropower operations and configuration, the projects conducted Juvenile Dam Passage Survival tests to assess the adequacy of technologies and found the Lower Columbia and Lower Snake hydroelectric generating facilities were already meeting the 96% and 93% survival targets for fish passage in the FCRPS 2016 Comprehensive Evaluation. In addition, as previously stated, the 2016 Evaluation includes results showing juvenile salmonid use of non-turbine routes to be 76-99%. This further shows the effectiveness of technologies and operations at the hydropower facilities on the Lower Columbia River to encourage salmonids to avoid cooling water intake structures, thus minimizing impingement mortality and entrainment.

Though the focus of these studies is threatened and endangered species, the combination of technologies to deter fish from intakes, encourage fish to travel through fish passage structures or over spillways, and decrease velocities through turbines, for example, all act to minimize impingement and entrainment of aquatic life at cooling water intakes. Fish surveys at the hydroelectric generating facilities have noted bull trout, lamprey, kelt and other listed species in juvenile fish bypass structures, indicating that other fish species use the structures designed for juvenile salmonid survival.

Table 19 summarizes the general technologies used at each project to maximize fish survivability from hydroelectric operations, described in the 2018-2019 FPP and 2016 BiOp Comprehensive Evaluation Report. It also summarizes dam passage survival rates for each project. Table 20 summarizes fish survival rates by fish species from 2008-2013.

Table [SEQ Table * ARABIC]. Hydropower Operations at Ice Harbor Lock and Dam, Lower Monumental Lock and Dam, Little Goose Lock and Dam, and Lower Granite Lock and Dam for Fish Survival (2018-2019)

	BTA	**Average Fish Survival Rates**
Ice Harbor Lock and Dam	*Non-turbine routes*: spill to maximize fish passage for juvenile salmonids, fish passage structures, submersible traveling screens (STS) to deter fish from entering	

	main unit turbines, vertical bar screens (VBS) at intakes *Turbine routes*: operate turbines at +/- 1% peak efficiency flows, operate turbines in priority order to maximize fish passage	
Lower Monumental Lock and Dam	*Non-turbine routes*: spill to maximize fish passage for juvenile salmonids, fish passage structures, STS to deter fish from entering main unit turbines, vertical bar VBS at intakes *Turbine routes*: operate turbines at +/- 1% peak efficiency flows, operate turbines in priority order to maximize fish passage	93-99% (2012-2013)
Little Goose Lock and Dam	*Non-turbine routes*: spill to maximize fish passage for juvenile salmonids, fish passage structures, VBS near intakes, extended length submersible bar screens (ESBS) to deflect fish to bypass structures *Turbine routes*: operate turbines at +/- 1% peak efficiency flows, operate turbines in priority order to maximize fish passage	91-99% (2012-2013)
Lower Granite Lock and Dam	*Non-turbine routes*: spill to maximize fish passage for juvenile salmonids, fish passage structures, ESBS, and VBS near intakes *Turbine routes*: operate turbines at +/- 1% peak efficiency flows, operate turbines in priority order to maximize fish passage	

Table [SEQ Table * ARABIC]. Juvenile Dam Passage Survival 2008-2013, 2014 FCRPS BiOp

Lower Monumental	2012	Yearling Chinook Salmon	98.88 (0.90)	2.35	78.89	Gas Cap (26 kcfs) / 29.7 kcfs
Lower Monumental	2012	Steelhead	98.26 (0.21)	2.17	65.85	Gas Cap (26 kcfs) / 29.7 kcfs
Lower Monumental	2012	Subyearling Chinook Salmon	97.89 (0.79)	2.60	83.56	17 kcfs / 25.2 kcfs
Lower Monumental	2013	Subyearling Chinook Salmon	92.97 (1.05)	2.99	89.10	17 kcfs / 19.8 kcfs
Little Goose	2012	Yearling Chinook Salmon	98.22 (0.76)	2.58	65.28	30% / 31.8%
Little Goose	2012	Steelhead	99.48 (0.81)	2.67	56.09	30% / 31.8%
Little Goose	2012	Subyearling Chinook Salmon	95.08 (0.97)	2.80	72.49	30% / 38.5%
Little Goose	2013	Subyearling Chinook Salmon	90.76 (1.39)	3.66	76.63	30% / 30%

The EPA has used this background information from the FCRPS 2019 BiOp to determine the adequacy of BTA. The EPA considered juvenile dam passage survival performance standards, Lower Monumental Lock and Dam and Little Goose Lock and Dam conducted at least two years of testing to determine fish survival targets at each project described earlier with results summarized in Tables 19 and 20. These rates are expected to be similar at Ice Harbor Lock and Dam and Lower Granite Lock and Dam, since these hydroelectric generating facilities operate similar technologies, FCRPS 2014 Supplemental BiOp requires the same fish survival goals, and fish survival studies have considered the effects of the entire FCRPS study area. As described earlier, the FCRPS 2014 BiOp RPAs further require annual studies to optimize fish passage. In addition, each facility has an RPA to optimize its operations for survival of threatened and endangered salmon, which require annual or biannual BiOp Implementation reports.

The EPA has determined that these biological studies and additional studies required by the FCRPS 2019 Supplemental BiOp are important to consider when determining the adequacy of BTA at the intake, since actions through the BiOp reduce the number of organisms that may be affected by impingement and entrainment of CWIS. Biological studies in the 2019 FCRPS Supplemental BiOp show survival rates for multiple endangered juvenile salmonids over 90% with technologies from 2008-2013. In comparison, 40 CFR 125.94(c)(7) requires a 12-month impingement mortality of no more than 24%, or a 76% survivability rate. Hydroelectric generating facilities have further optimized operations and technologies through improvements documented in annual Fish Passage Plans. Though these studies are for juvenile salmonids, these fish species are a reasonable proxy for other fish species, such as bull trout, lamprey, and kelt observed in juvenile fish passage structures, since threatened and endangered salmon are the most sensitive species. In addition, as described earlier, the rate of juvenile salmonids entering in non-turbine pathways range from 76-99% showing that fish in general may be avoiding hydroelectric water intake structures which supply water from which cooling water intakes withdraw. These BTA with other permit requirements will help ensure that fish impingement mortality and entrainment at cooling water intake structures are minimized and that they are maintained and optimized throughout the permit cycle.

Draft 316(b) permit conditions for Grand Coulee Dam on the Columbia River, Washington
(**Not** subject to the Federal Columbia River Power System 2019 Biological Opinion)

Ex. 5 Deliberative Process (DP)

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Proposed draft Fact Sheet 316(b) language for Grand Coulee Dam, Columbia River

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